

# Warmup 3/3

Find all solutions for

①  $3\cot^2 x + 4 = 7$

$3\cot^2 x = 3$

$\cot^2 x = 1$

$\cot x = \pm\sqrt{1}$

$\cot x = \pm 1$

$\tan x = \pm 1$

$\frac{\pi}{4} + \pi n, \frac{3\pi}{4} + \pi n$

②  $x^4 + 3x^2 - 4 = 0$

$(x^2 + 4)(x^2 - 1) = 0$

$x^2 + 4 = 0$

$x^2 = -4$

$x = \pm\sqrt{-4}$

$x = \pm 2i$

$x^2 - 1 = 0$

$x^2 = 1$

$x = \pm 1$

## 5.3 day 2 ex 3 + 5

Goal: Continue to be able to solve trig equations using the method of factoring & rewriting in terms of a single trig fun.

ex) Solve  $2\sin^2 x + \sin x - 1 = 0$   $x \in [0, 2\pi]$

$2u^2 + u - 1 = 0$

let  $u = \sin x$

$(2u - 1)(u + 1) = 0$

$(2\sin x - 1)(\sin x + 1) = 0$

$2\sin x = 1$   $\sin x = -1$

$\sin x = \frac{1}{2}$

$\frac{\pi}{6}, \frac{5\pi}{6}$

$\frac{3\pi}{2}$

~~$-2$~~   
 ~~$-1$~~

$$x \in [0, 3\pi)$$

$$2 \sin x \cos x = \sqrt{2} \cos x$$

$$2 \sin x \cos x - \sqrt{2} \cos x = 0$$

$$\cos x (2 \sin x - \sqrt{2}) = 0$$

$$\cos x = 0 \quad 2 \sin x - \sqrt{2} = 0$$

$$\frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}$$

$$\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$$

$$\text{y<sup>+</sup> } \textcircled{1} \quad \cos^4 x + \cos^2 x - 2 = 0 \quad x \in [0, 2\pi)$$

$$(\cos^2 x + 2)(\cos^2 x - 1) = 0$$

$$\cos^2 x + 2 = 0$$

$$\cos^2 x - 1 = 0$$

$$\cos^2 x = -2$$

$$\cos^2 x = 1$$

$$\cos x = \pm\sqrt{-2}$$

$$\cos x = \pm 1$$

||

∩

$$0\pi, \pi$$

$$\textcircled{2} \quad \cos x \tan x = \sqrt{3} \cos x \quad x \in [0, 2\pi)$$

$$\cos x \tan x - \sqrt{3} \cos x = 0$$

$$\cos x (\tan x - \sqrt{3}) = 0$$

$$\cos x = 0 \quad \tan x - \sqrt{3} = 0$$

$$\tan x = \sqrt{3}$$

$$\frac{\pi}{2}, \frac{3\pi}{2}$$

$$\frac{\pi}{3}, \frac{4\pi}{3}$$

$$x \in [0, 2\pi]$$

ex)  $1 - \cos x = 2 \sin^2 x$

$$1 - \cos x = 2(1 - \cos^2 x)$$

$$1 - \cos x = 2 - 2 \cos^2 x$$

$$2 \cos^2 x - \cos x - 1 = 0$$

$$(2 \cos x + 1)(\cos x - 1) = 0$$

$$2 \cos x + 1 = 0 \quad \cos x - 1 = 0$$

$$\frac{2 \cos x}{2} = -\frac{1}{2} \quad \cos x = 1$$

$$\cos x = -\frac{1}{2} \quad 0\pi, 2\pi$$

$$\frac{2\pi}{3}, \frac{4\pi}{3}$$

ex)  $\cot^2 x \csc^2 x + 2 \csc^2 x - \cot^2 x = 2 \quad [0, 2\pi]$

$$\cot^2 x (1 + \cot^2 x) + 2(1 + \cot^2 x) - \cot^2 x = 2$$

$$\cot^2 x + \cot^4 x + 2 + 2 \cot^2 x - \cot^2 x = 2$$

$$\cot^4 x + 2 \cot^2 x = 0$$

$$\cot^2 x (\cot^2 x + 2) = 0$$

$$\cot^2 x = 0 \quad \cot^2 x + 2 = 0$$

$$\cot x = 0 \quad \cot x = \pm \sqrt{-2}$$

$$\frac{\pi}{2}, \frac{3\pi}{2}$$

$$\text{no real solutions}$$

yt)  $\sin^2 x - \sin x + 1 = \cos^2 x$

$$\sin^2 x - \sin x + 1 = 1 - \sin^2 x$$

$$2 \sin^2 x - \sin x = 0$$

all values of x